

WHAT IS CLAIMED:

1. A complex comprising:
colloid particles having an ion exchange capacity and having attached one
5 or more ligands with a charge and a hydrophobic domain, and
one or more pharmaceutical compounds associated with either or both of
the colloid particles and the one or more ligands.
2. The complex according to claim 1, wherein the colloid particles are
10 selected from the group consisting of natural clays, synthetic clays, zeolites, hydrotalcite,
kaolinite, talc, halloysite, sepiolite, illite, chlorite, and palygorskite.
3. The complex according to claim 2, wherein the colloid particles are
synthetic clay selected from the group consisting of layered hydrous magnesium silicate,
15 synthetic mica-montmorillonite, and mixtures thereof.
4. The complex according to claim 2, wherein the colloid particles are
natural clay selected from the group consisting of hectorite, aliettite, beidellite,
nontronite, saponite, sauconite, stevensite, swinefordite, volkonskoite, yakhontovite,
20 montmorillonite, bentonite, and mixtures thereof.
5. The complex according to claim 1, wherein the ligand is selected
from the group consisting of quaternary ammonium compounds, ionic polymers, ionic
surfactants, and mixtures thereof.
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6. The complex according to claim 5, wherein the ligand is a
quaternary ammonium compound selected from the group consisting of
hexadecyltrimethyl ammonium bromide, trimethylphenyl ammonium chloride, and
mixtures thereof.
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7. The complex according to claim 1, wherein the one or more ligands
comprise at least two ligands.

8. The complex according to claim 7, wherein the at least two ligands are different.

9. The complex according to claim 1, wherein the quantity of ligand
5 attached to the colloid particles is in excess of and up to 200% of the ion exchange capacity of the colloid particles.

10. The complex according to claim 1, wherein the pharmaceutical compound is an insect repellent, a sunscreen, or combinations thereof.

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11. A method for preventing or reducing surface absorption of one or more pharmaceutical compounds comprising:

applying to a surface a complex comprising:

colloid particles having an ion exchange capacity and having
15 attached one or more ligands with a charge and a hydrophobic domain, and
one or more pharmaceutical compounds associated with either or both of the colloid particles and the one or more ligands.

12. The method according to claim 11, wherein the colloid particles are
20 selected from the group consisting of natural clays, synthetic clays, zeolites, hydrotalcite, kaolinite, talc, halloysite, sepiolite, illite, chlorite, and palygorskite.

13. The method according to claim 12, wherein the colloid particles are
synthetic clay selected from the group consisting of layered hydrous magnesium silicate,
25 synthetic mica-montmorillonite, and mixtures thereof.

14. The method according to claim 12, wherein the colloid particles are
natural clay selected from the group consisting of hectorite, aliettite, beidellite,
nontronite, saponite, sauconite, stevensite, swinefordite, volkonskoite, yakhontovite,
30 montmorillonite, bentonite, and mixtures thereof.

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15. The method according to claim 11, wherein the ligand is selected from the group consisting of quaternary ammonium compounds, ionic polymers, ionic surfactants, and mixtures thereof.

5 16. The method according to claim 15, wherein the ligand is a quaternary ammonium compound selected from the group consisting of hexadecyltrimethyl ammonium bromide, trimethylphenyl ammonium chloride, and mixtures thereof.

10 17. The method according to claim 11, wherein the one or more ligands comprise at least two ligands.

18. The method according to claim 17, wherein the at least two ligands are different.

15 19. The method according to claim 11, wherein the quantity of ligand attached to the colloid particles is in excess of and up to 200% of the ion exchange capacity of the colloid particles.

20 20. The method according to claim 11, wherein the one or more pharmaceutical compounds are an insect repellent, a sunscreen, or combinations thereof.

21. The method according to claim 11, wherein the surface is selected from the group consisting of skin and cloth.

25 22. A method for delayed percutaneous delivery of one or more pharmaceutical compounds comprising:

applying topically a complex comprising:

30 colloid particles having an ion exchange capacity and having attached one or more ligands with a charge and a hydrophobic domain, and one or more pharmaceutical compounds associated with either or both of the colloid particles and the one or more ligands.

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23. The method according to claim 22, wherein the colloid particles are selected from the group consisting of natural clays, synthetic clays, zeolites, hydrotalcite, kaolinite, talc, halloysite, sepiolite, illite, chlorite, and palygorskite.

5 24. The method according to claim 23, wherein the colloid particles are synthetic clay selected from the group consisting of layered hydrous magnesium silicate, synthetic mica-montmorillonite, and mixtures thereof.

10 25. The method according to claim 23, wherein the colloid particles are natural clay selected from the group consisting of hectorite, aliettite, beidellite, nontronite, saponite, sauconite, stevensite, swinefordite, volkonskoite, yakhontovite, montmorillonite, bentonite, and mixtures thereof.

15 26. The method according to claim 22, wherein the ligand is selected from the group consisting of quaternary ammonium compounds, ionic polymers, ionic surfactants, and mixtures thereof.

20 27. The method according to claim 26, wherein the ligand is a quaternary ammonium compound selected from the group consisting of hexadecyltrimethyl ammonium bromide, trimethylphenyl ammonium chloride, and mixtures thereof.

25 28. The method according to claim 22, wherein the one or more ligands comprise at least two ligands.

29. The method according to claim 28, wherein the at least two ligands are different.

30 30. The method according to claim 22, wherein the quantity of ligand attached to the colloid particles is in excess of and up to 200% of the ion exchange capacity of the colloid particles.

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31. The method according to claim 22, wherein the one or more pharmaceutical compounds are an insect repellent, a sunscreen, or combinations thereof.

32. The method according to claim 22, wherein applying topically comprises applying in the form of a solution, lotion, cream, gel, aerosol, impregnated towellette, or pump spray.

33. A surface coated with colloid particles having attached one or more ligands with a charge and a hydrophobic domain and one or more pharmaceutical compounds associated with either or both of the colloid particles and the one or more ligands.

34. The surface according to claim 33, wherein the colloid particles are selected from the group consisting of natural clays, synthetic clays, zeolites, hydrotalcite, kaolinite, talc, halloysite, sepiolite, illite, chlorite, and palygorskite.

35. The surface according to claim 34, wherein the colloid particles are synthetic clay selected from the group consisting of layered hydrous magnesium silicate, synthetic mica-montmorillonite, and mixtures thereof.

36. The surface according to claim 34, wherein the colloid particles are natural clay selected from the group consisting of hectorite, aliettite, beidellite, nontronite, saponite, sauconite, stevensite, swinefordite, volkonskoite, yakhontovite, montmorillonite, bentonite, and mixtures thereof.

37. The surface according to claim 33, wherein the ligand is selected from the group consisting of quaternary ammonium compounds, ionic polymers, ionic surfactants, and mixtures thereof.

38. The surface according to claim 37, wherein the ligand is a quaternary ammonium compound selected from the group consisting of hexadecyltrimethyl ammonium bromide, trimethylphenyl ammonium chloride, and mixtures thereof.

39. The surface according to claim 33, wherein the one or more ligands comprise at least two ligands.

5 40. The surface according to claim 39, wherein the at least two ligands are different.

41. The surface according to claim 33, wherein the quantity of ligand attached to the colloid particles is in excess of and up to 200% of the ion exchange
10 capacity of the colloid particles.

42. The surface according to claim 33, wherein the one or more pharmaceutical compounds are an insect repellent, a sunscreen, or combinations thereof.

15 43. The surface according to claim 33, wherein the surface is selected from the group consisting of skin and cloth.

44. A method of making a complex comprising:
providing colloid particles having an ion exchange capacity and having
20 attached one or more ligands with a charge and a hydrophobic domain, and
exposing the colloid particles to one or more pharmaceutical compounds under conditions effective to produce a complex including the one or more pharmaceutical compounds associated with either or both of the colloid particles and the one or more ligands.

25 45. The method according to claim 44, wherein the colloid particles are selected from the group consisting of natural clays, synthetic clays, zeolites, hydrotalcite, kaolinite, talc, halloysite, sepiolite, illite, chlorite, and palygorskite.

30 46. The method according to claim 45, wherein the colloid particles are synthetic clay selected from the group consisting of layered hydrous magnesium silicate, synthetic mica-montmorillonite, and mixtures thereof.

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47. The method according to claim 45, wherein the colloid particles are natural clay selected from the group consisting of hectorite, aliettite, beidellite, nontronite, saponite, sauconite, stevensite, swinefordite, volkonskoite, yakhontovite, montmorillonite, bentonite, and mixtures thereof.

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48. The method according to claim 44, wherein the ligand is selected from the group consisting of quaternary ammonium compounds, ionic polymers, ionic surfactants, and mixtures thereof.

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49. The method according to claim 48, wherein the ligand is a quaternary ammonium compound selected from the group consisting of hexadecyltrimethyl ammonium bromide, trimethylphenyl ammonium chloride, and mixtures thereof.

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50. The method according to claim 44, wherein the one or more ligands comprise at least two ligands.

51. The method according to claim 50, wherein the at least two ligands are different.

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52. The method according to claim 44, wherein the quantity of ligand attached to the colloid particles is in excess of and up to 200% of the ion exchange capacity of the colloid particles.

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53. The method according to claim 44, wherein the pharmaceutical compound is an insect repellent, a sunscreen, or combinations thereof.

54. The method according to claim 44, wherein exposing comprises mixing the colloid particles having attached one or more ligands with a solution of the one or more pharmaceutical compounds.

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55. The method according to claim 44, wherein the exposing is from about 1 day to about 30 days.

56. The method according to claim 55, wherein the exposing is from about 8 days to about 30 days.

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